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(54) **Image formation apparatus**

(57) The image formation apparatus has an image bearing member eg. a photoconductive drum and process devices acting on the image bearing member, characterized by a cover movable to a first position for covering the surface of the image bearing member and a second position retracted away from said first position, and a device for moving the cover. Thus, if the apparatus is entered for maintenance or removal of some or all parts, the surface of the photoconductor is protected for contact and/or exposure to light.

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FIG. 1

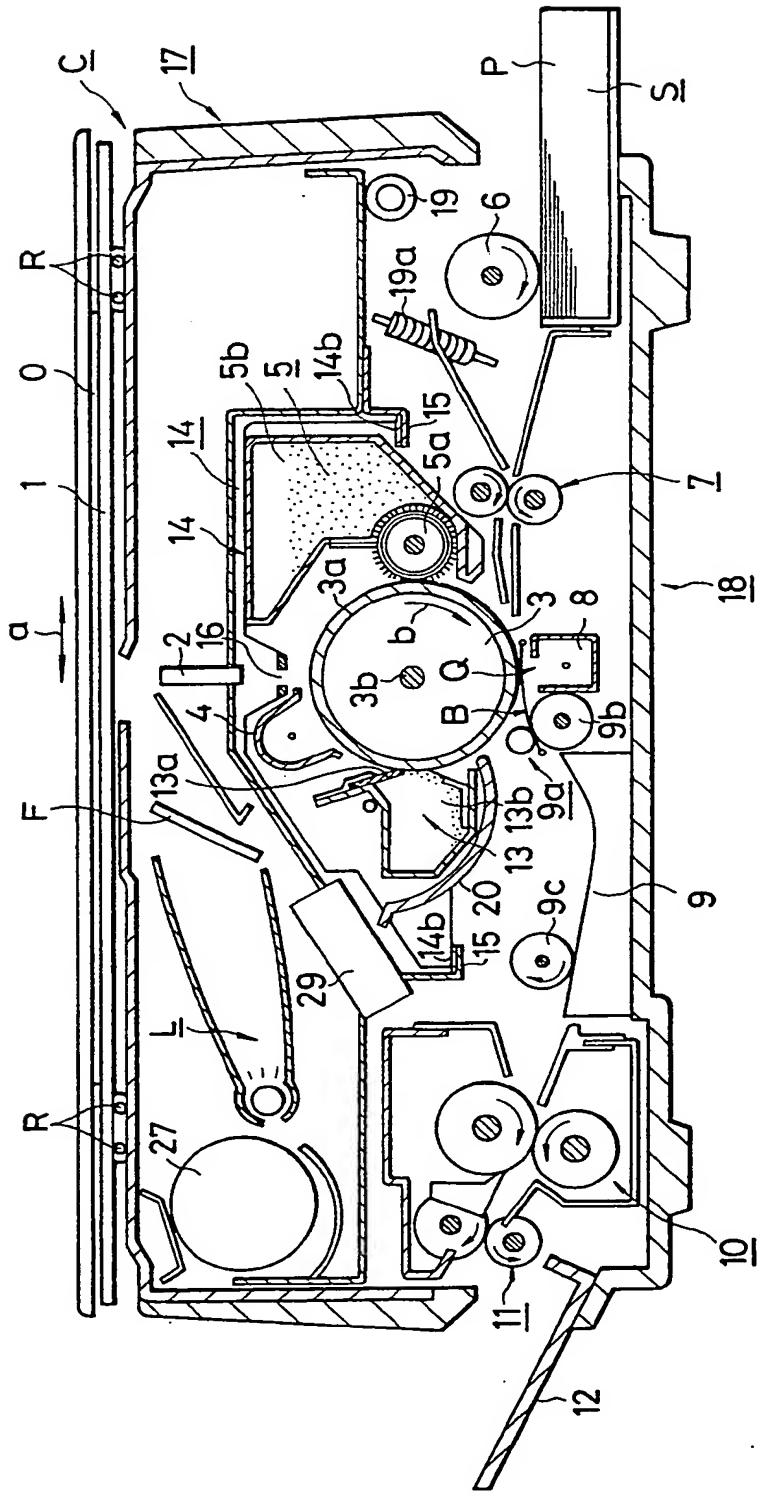

FIG. 2

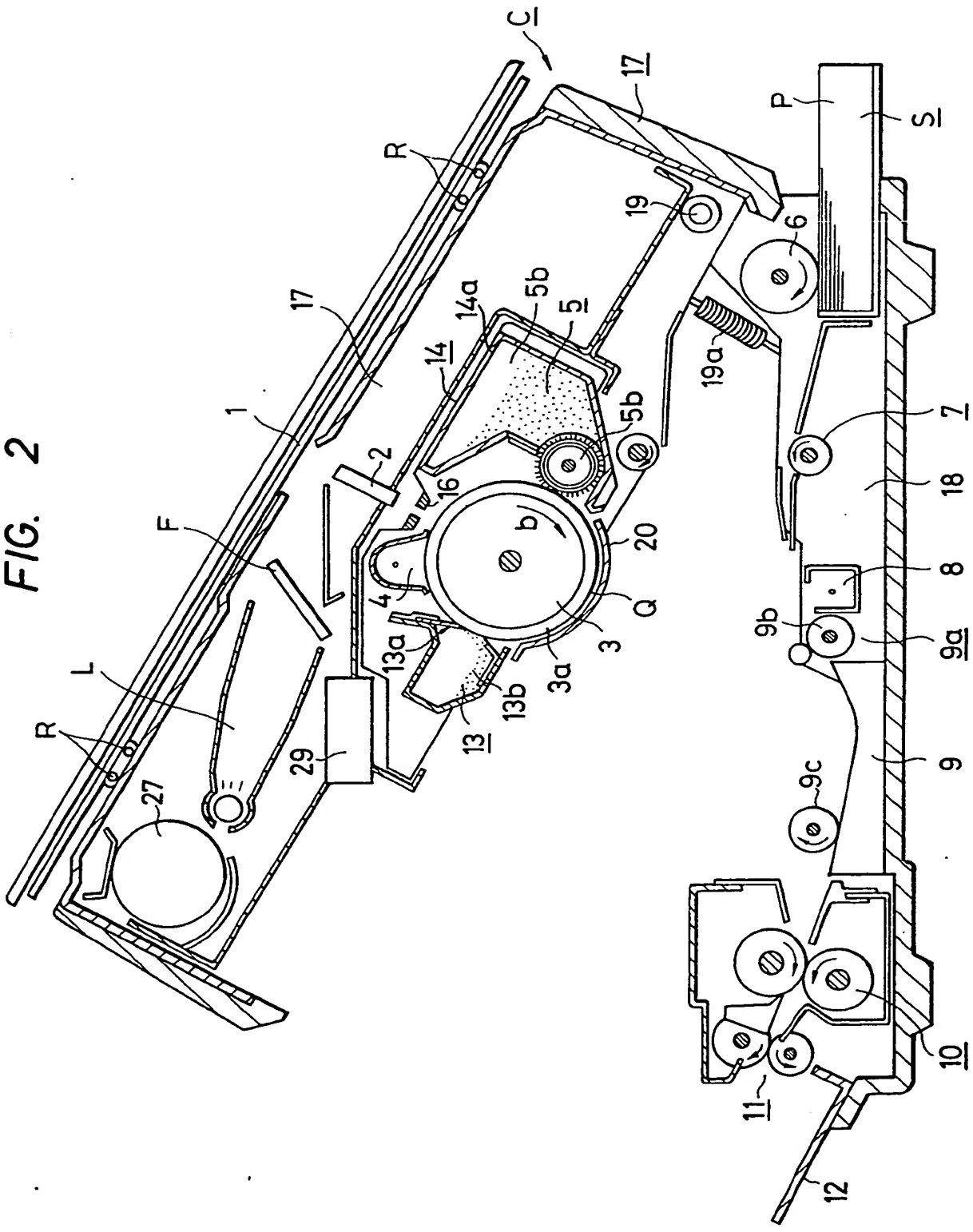

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FIG. 3

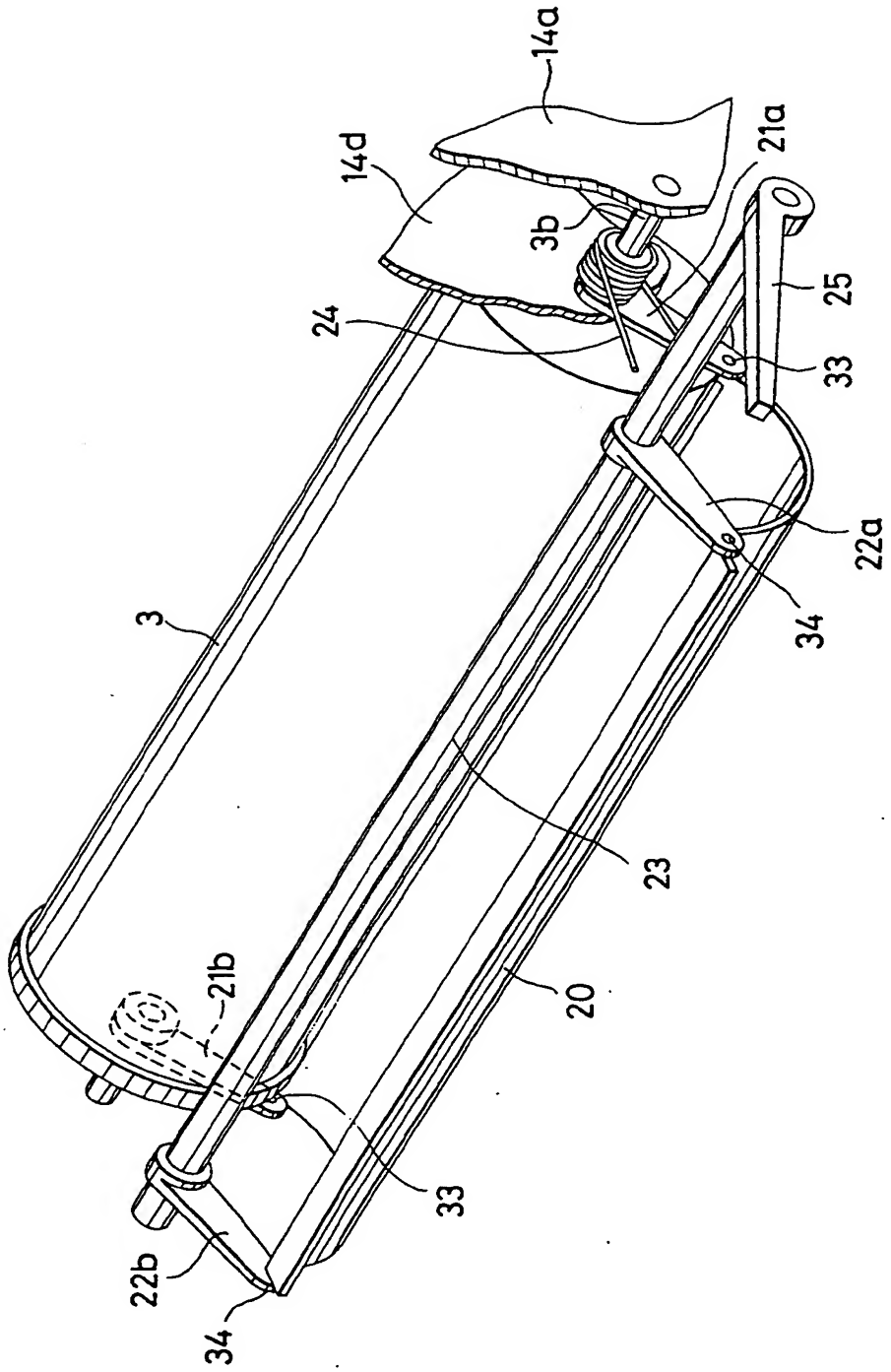

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FIG. 4

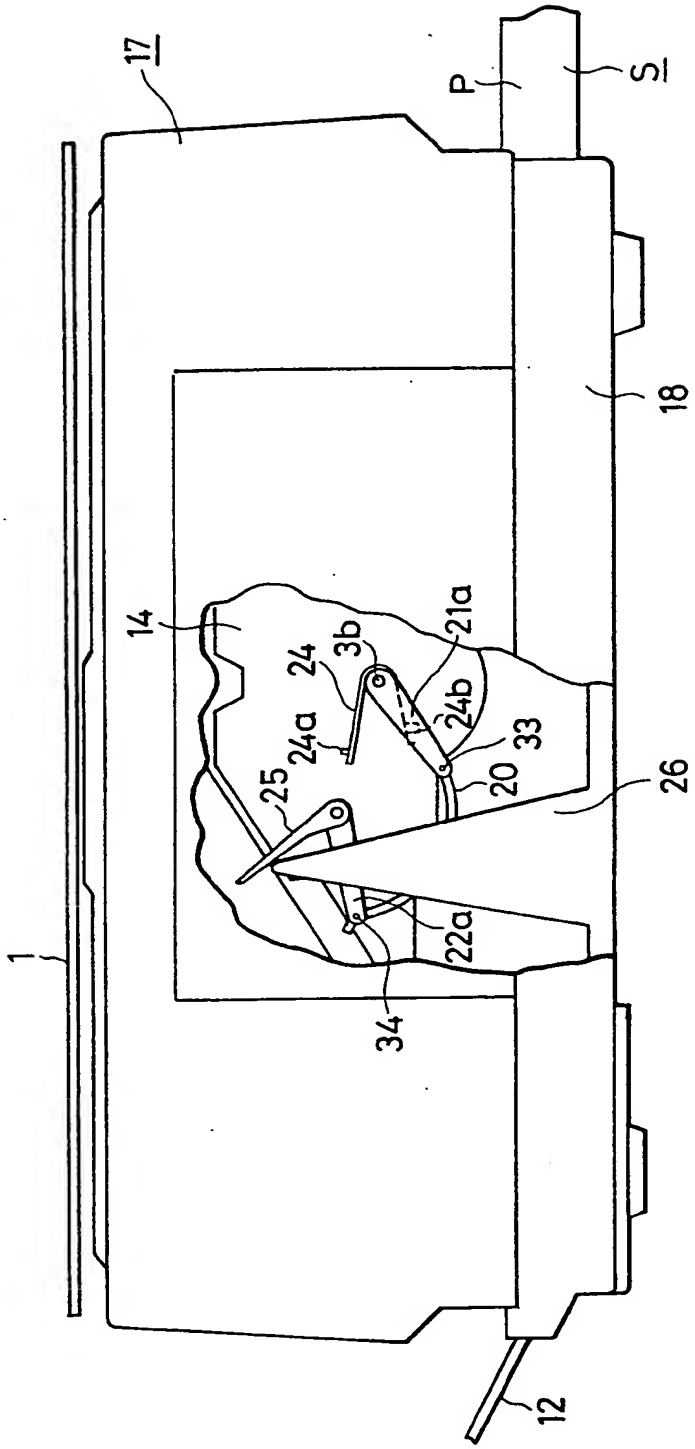

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FIG. 5

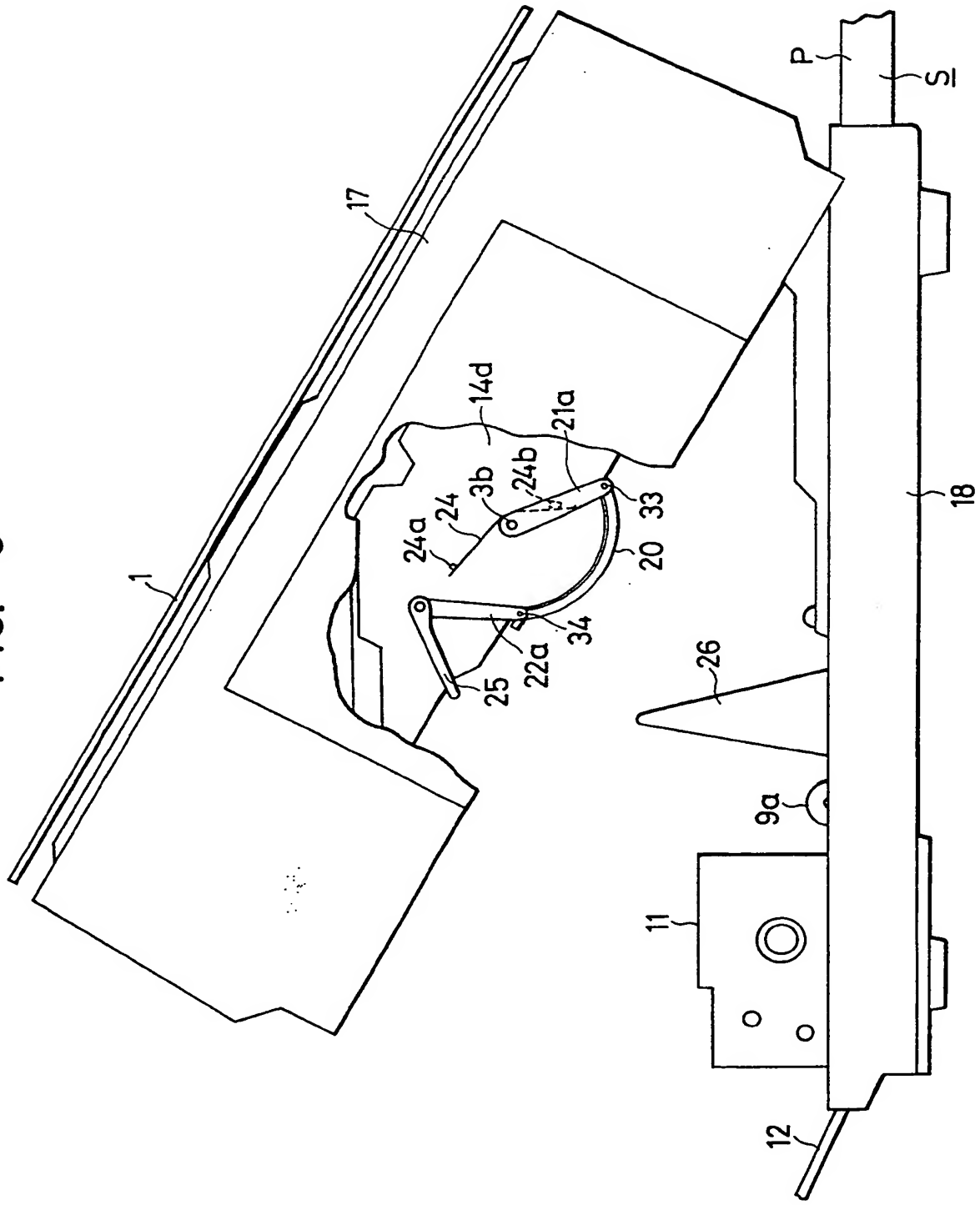

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FIG. 6

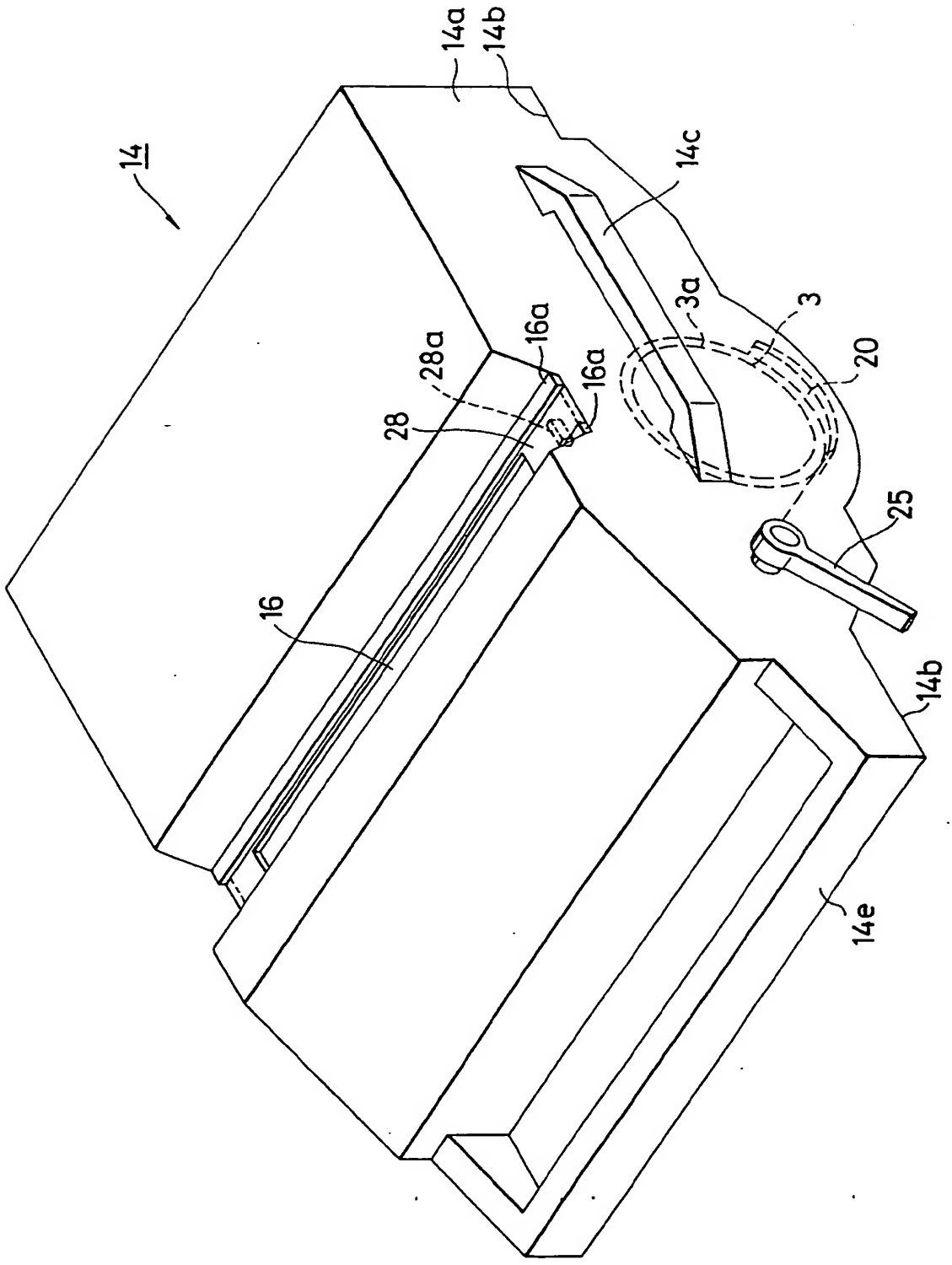

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FIG. 7

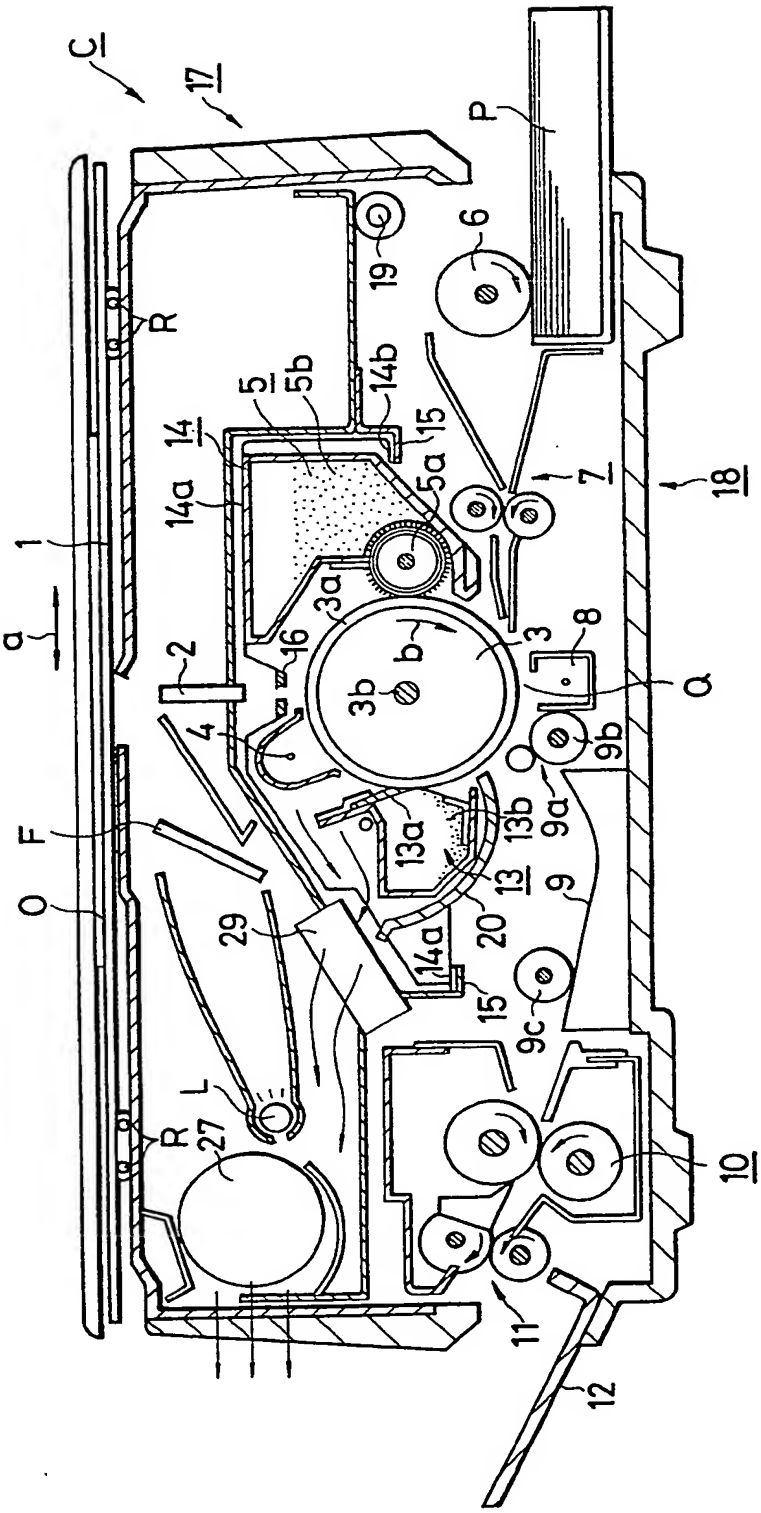

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FIG. 8

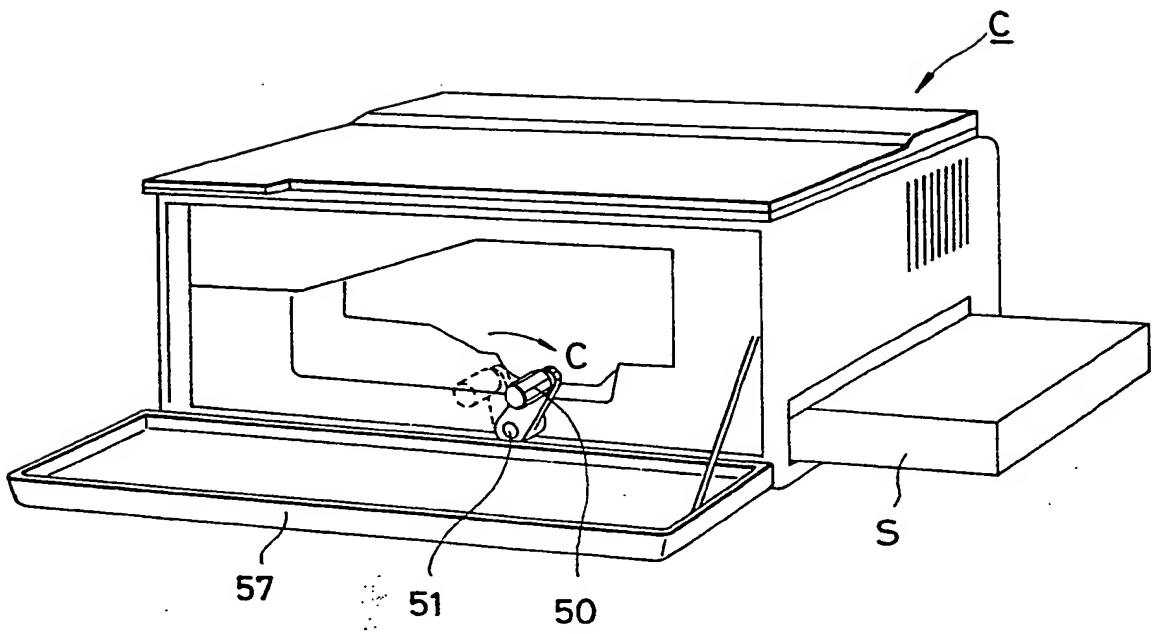

FIG. 9

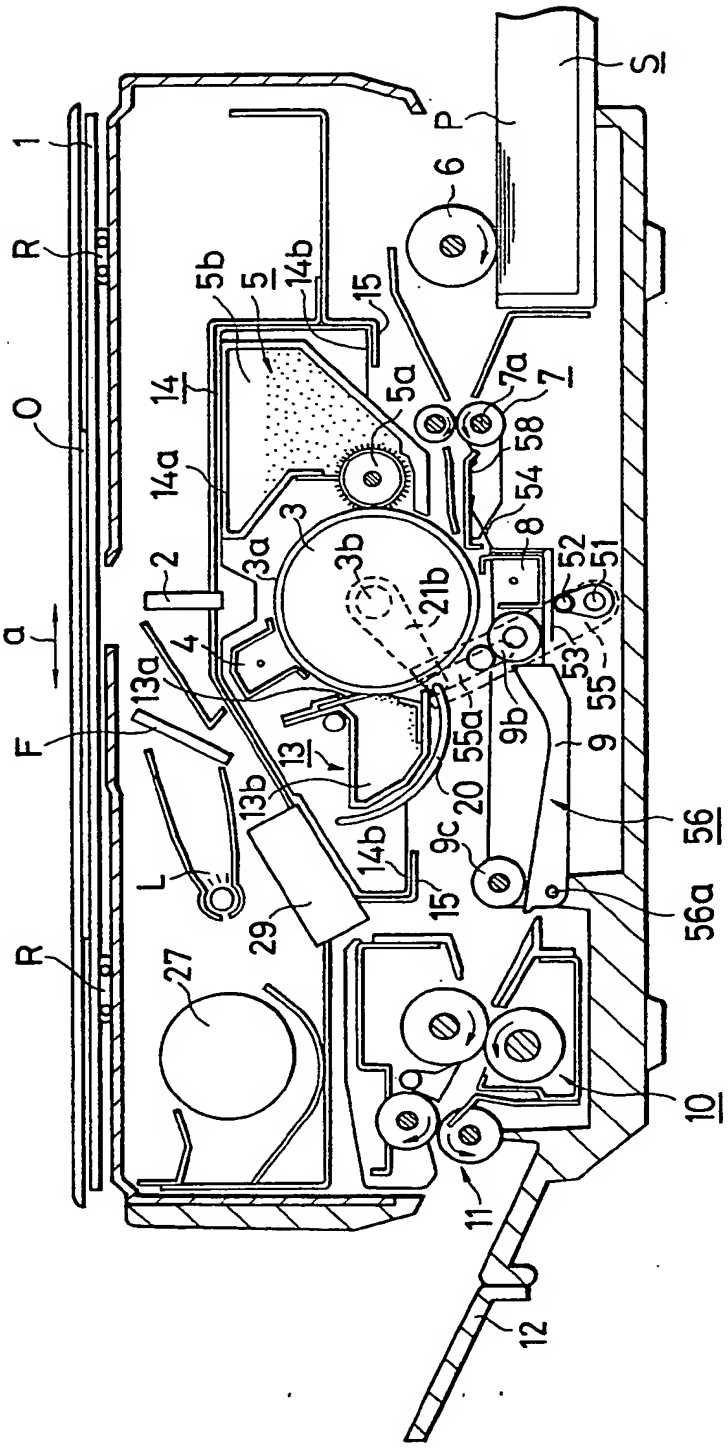

FIG. 10

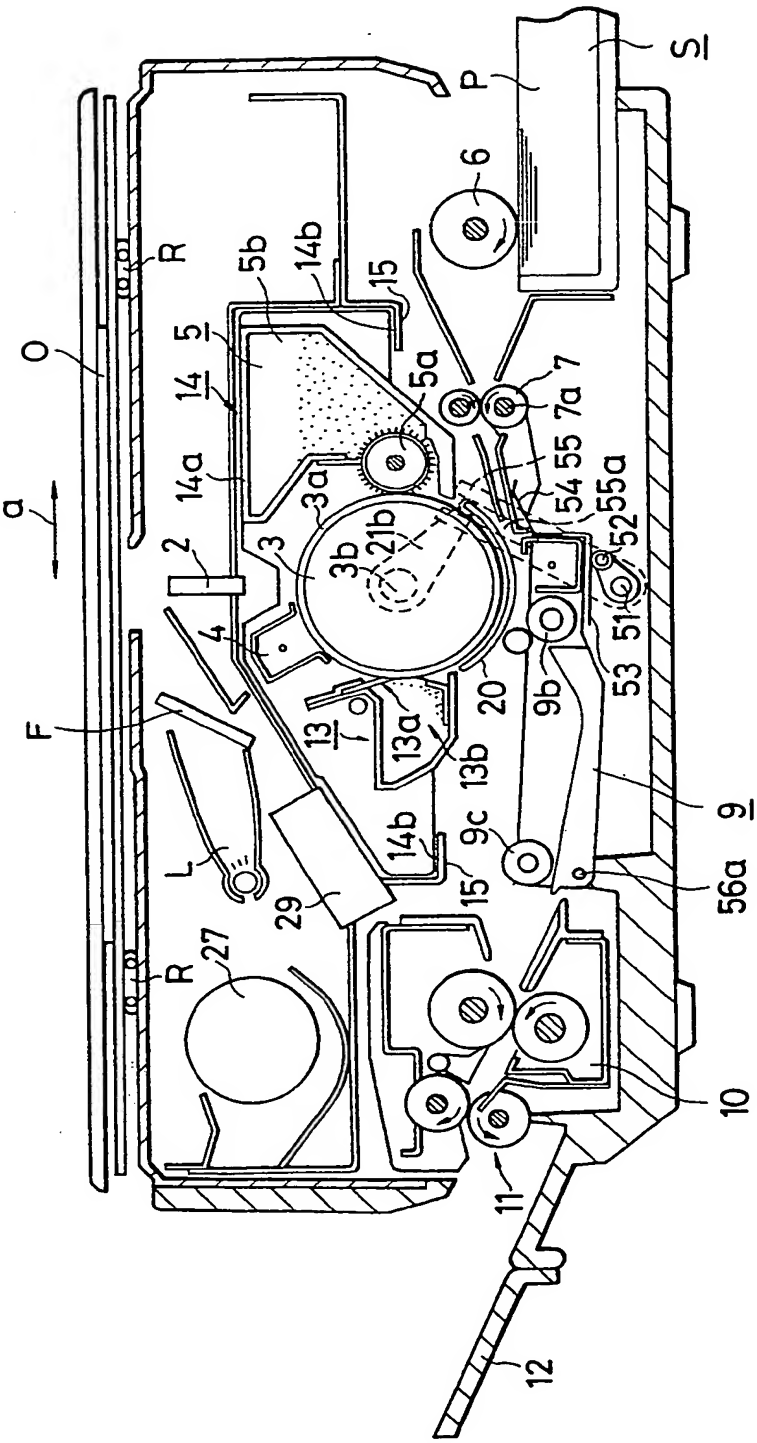

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FIG. 11

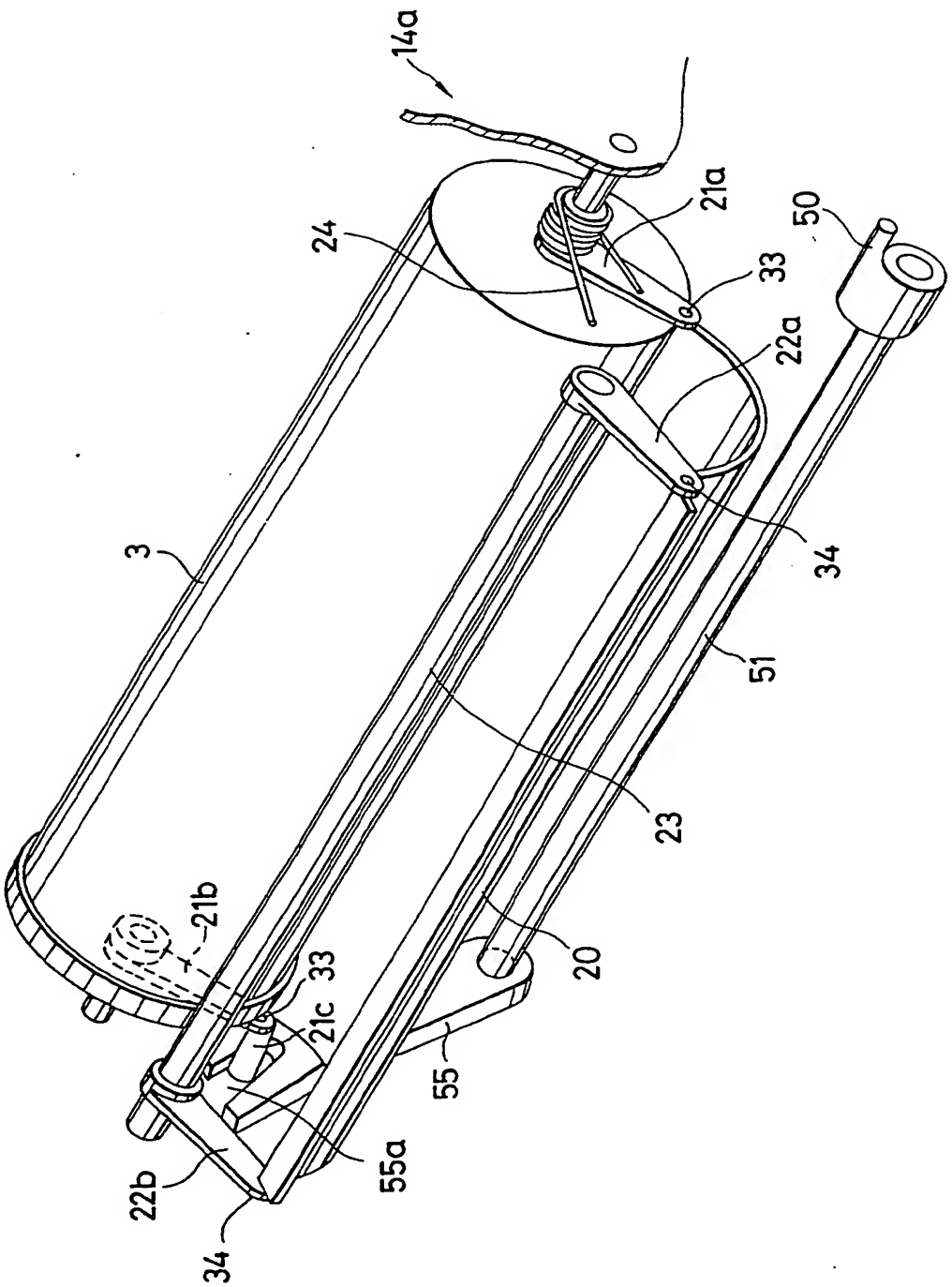

FIG. 12

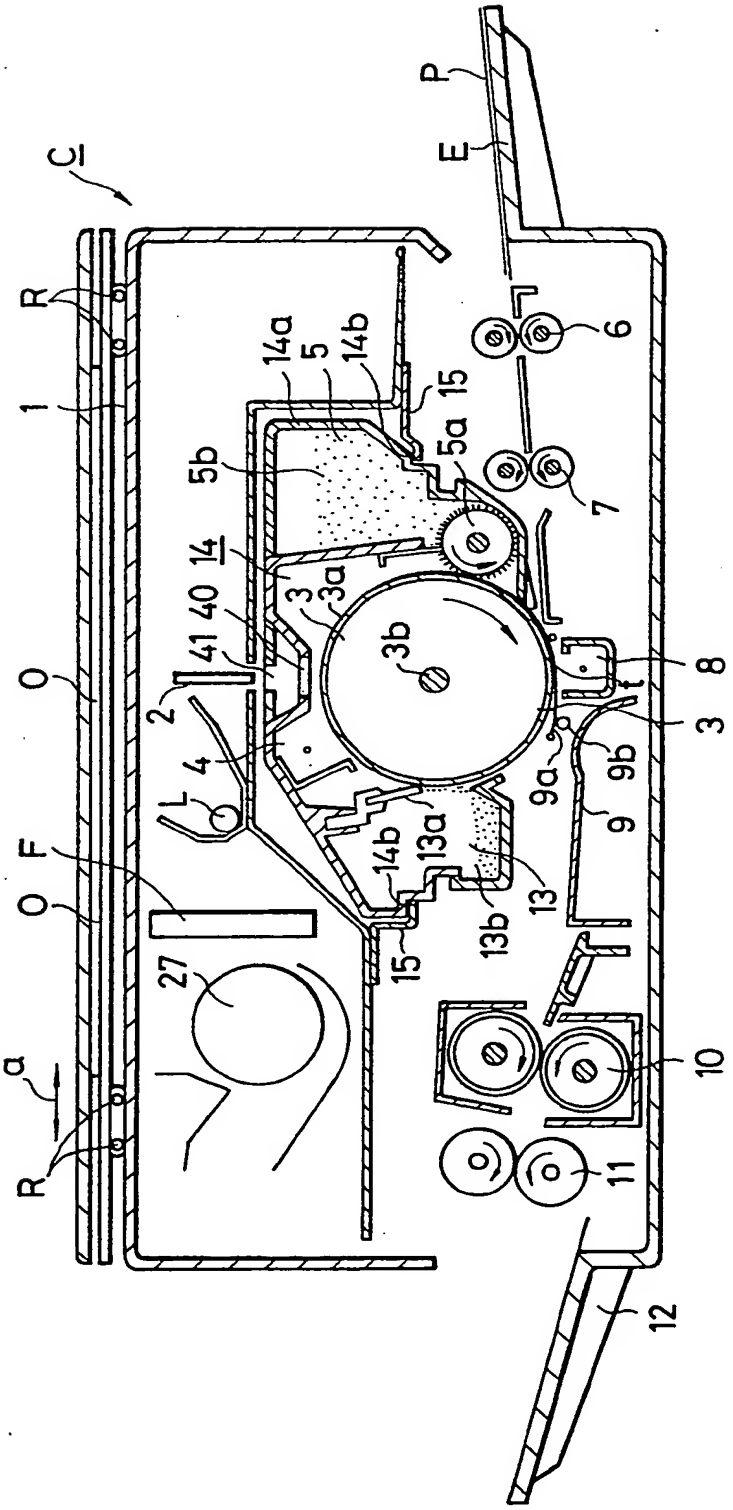

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FIG. 13

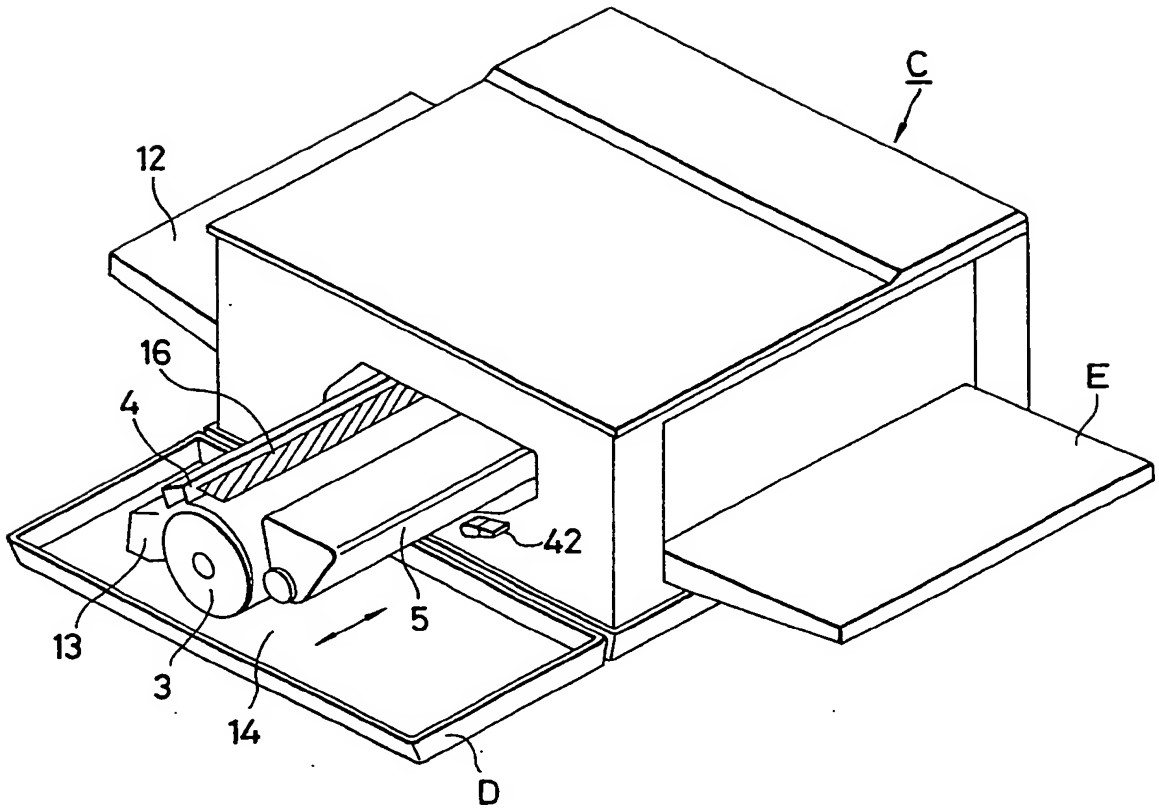

FIG. 14

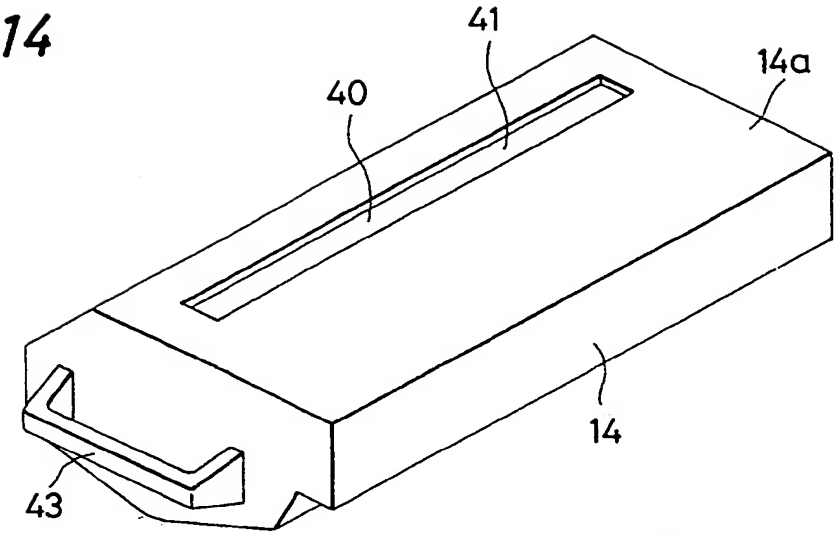

FIG. 15

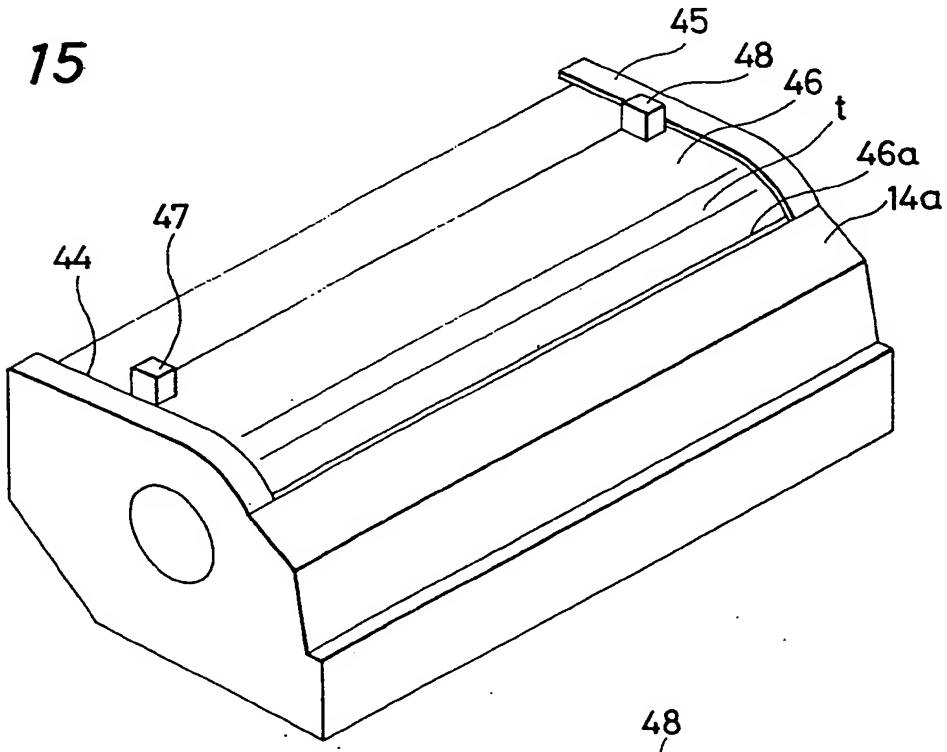

FIG. 16

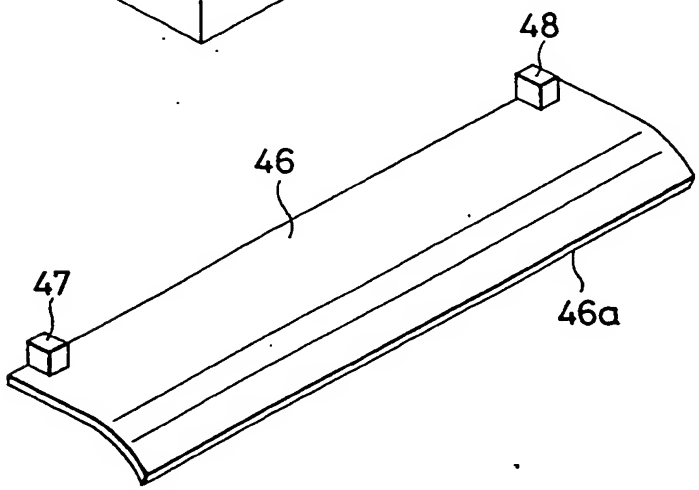

FIG. 17

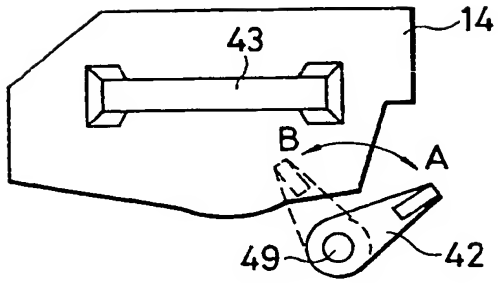

FIG. 18

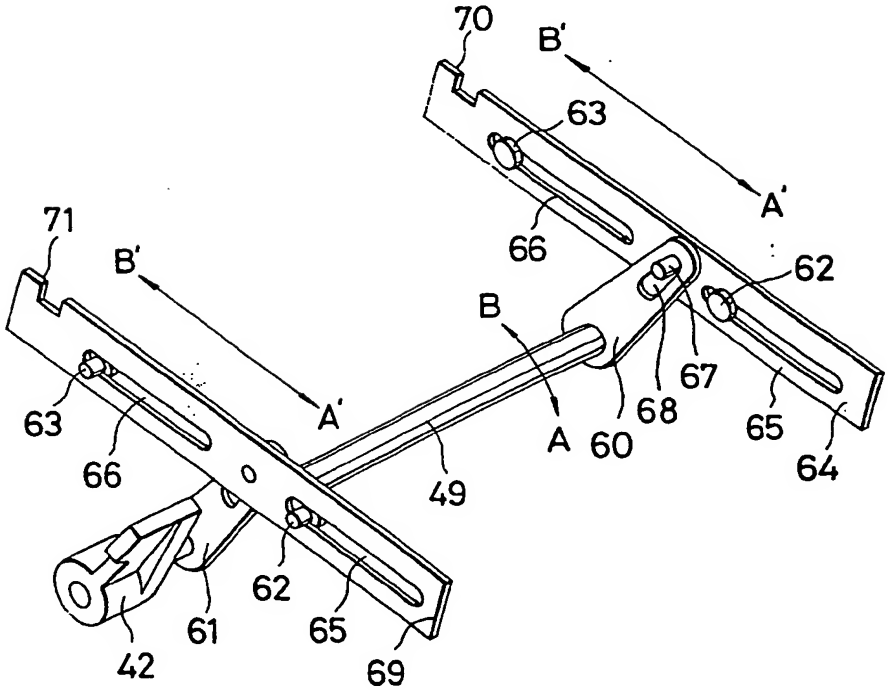

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FIG. 19

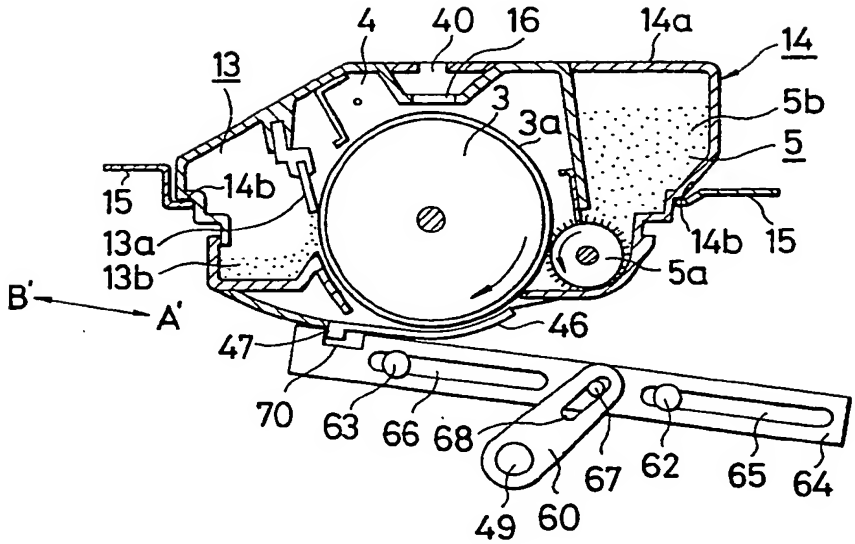

FIG. 20

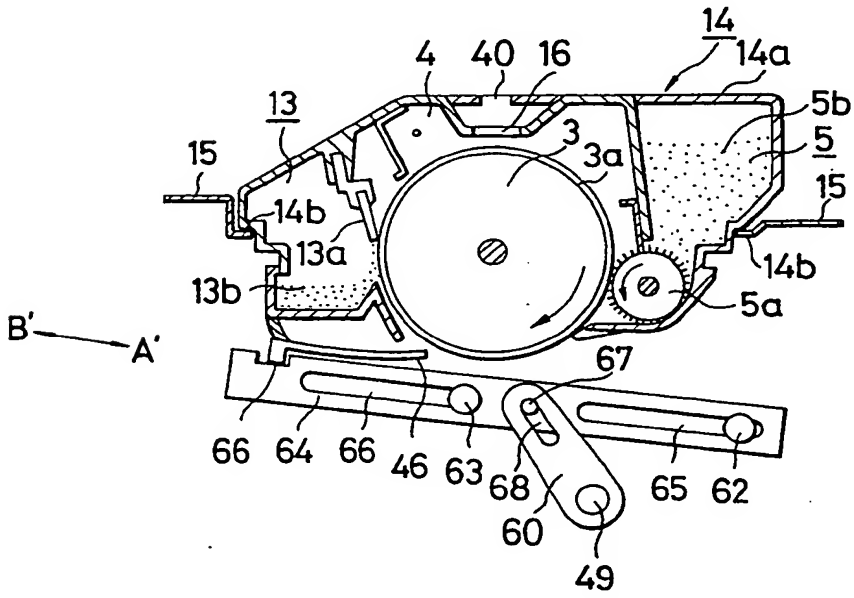

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FIG. 21

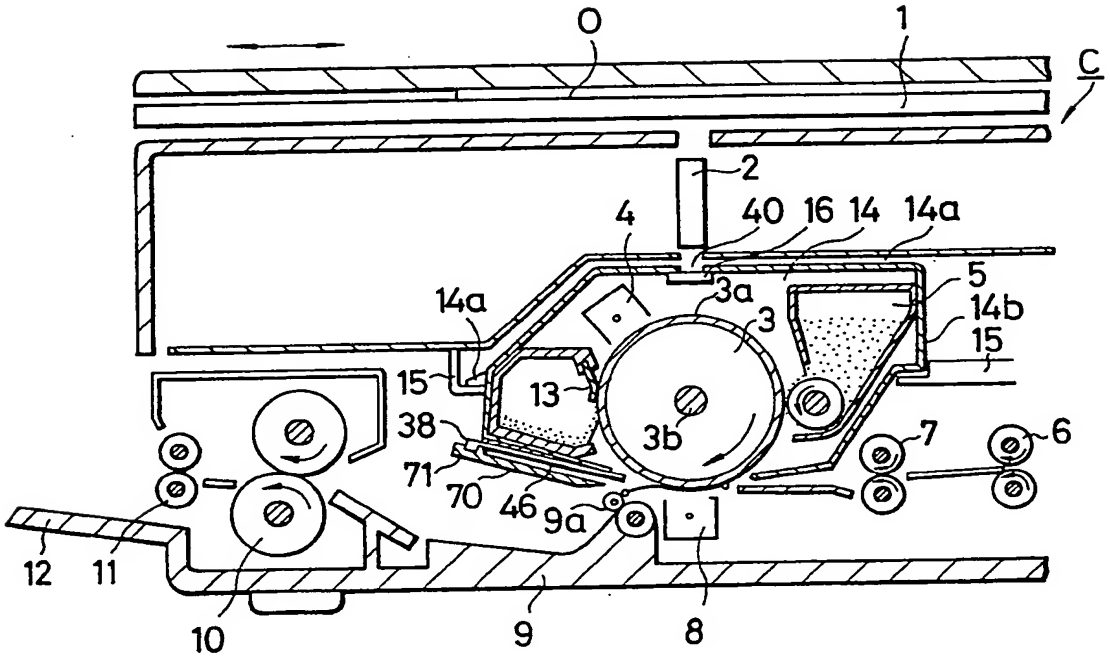

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FIG. 22

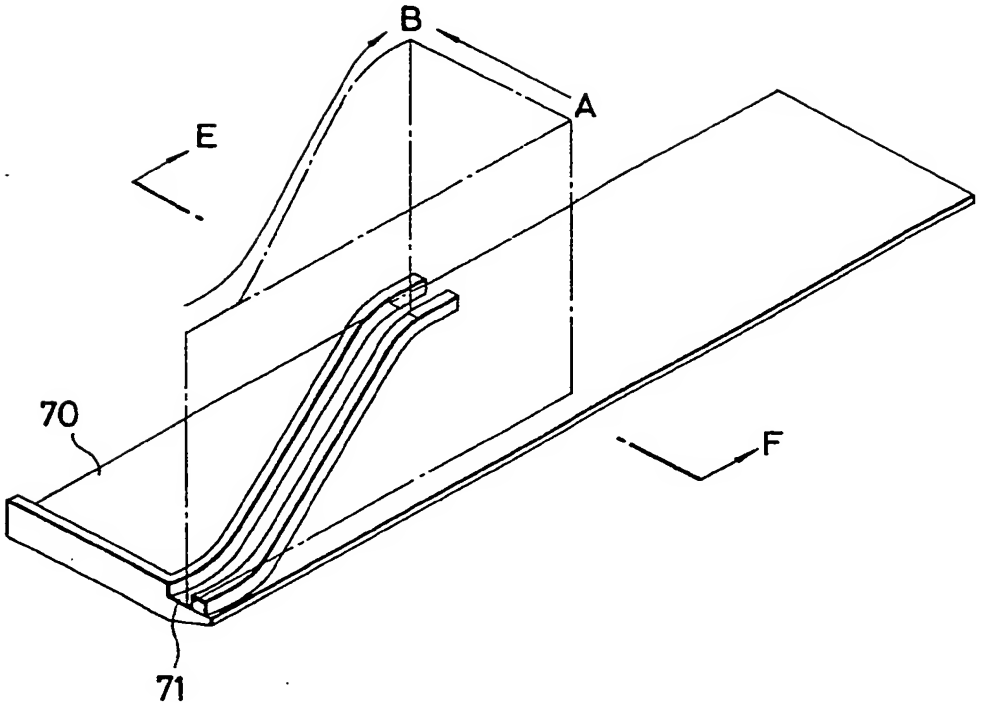

FIG. 23

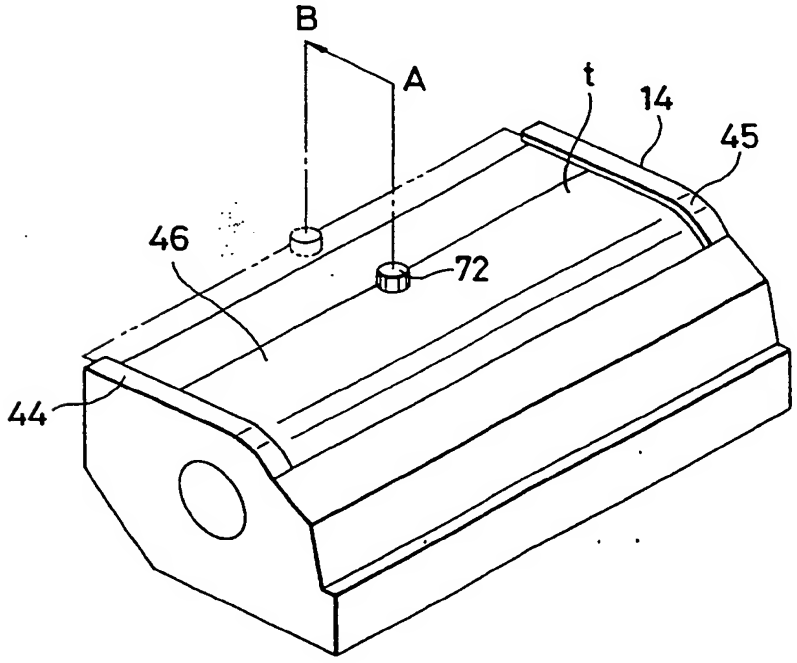

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FIG. 24

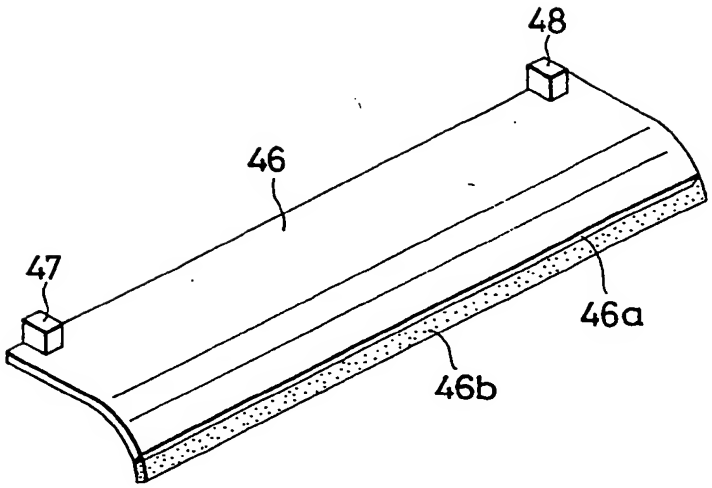

FIG. 25

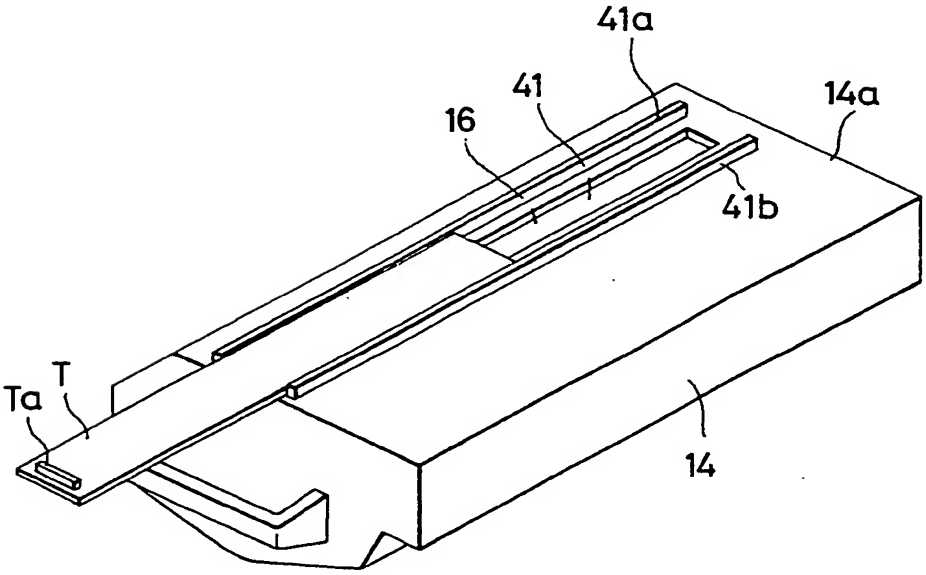

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FIG. 26A

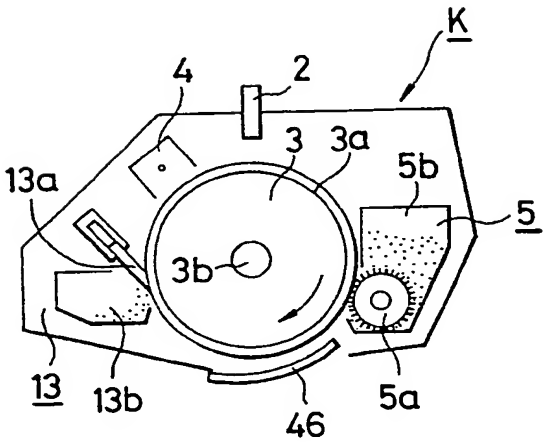


FIG. 26B

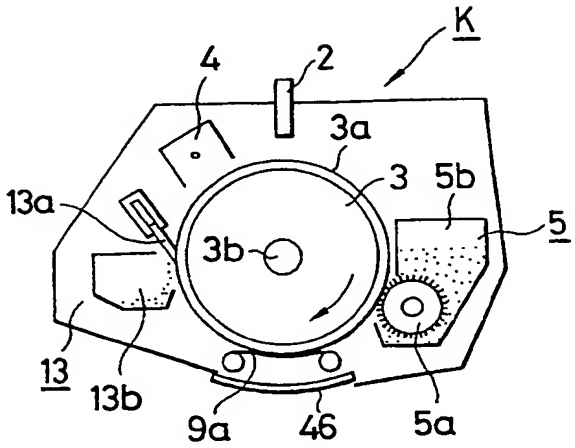


FIG. 26C

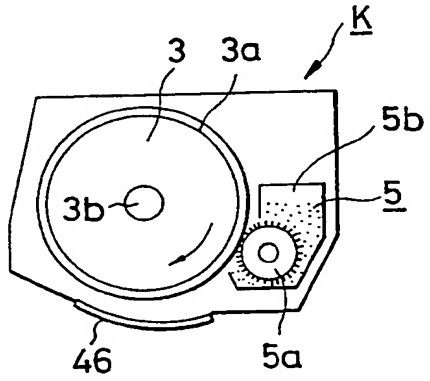


FIG. 26D

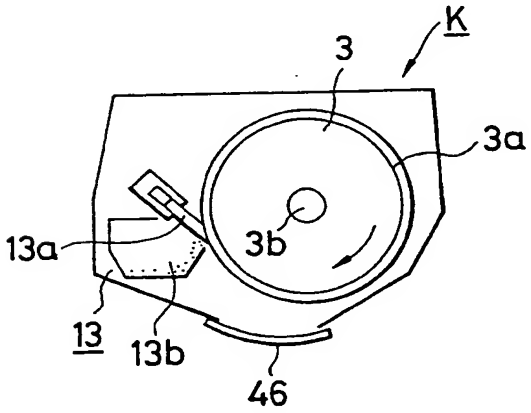


FIG. 26E

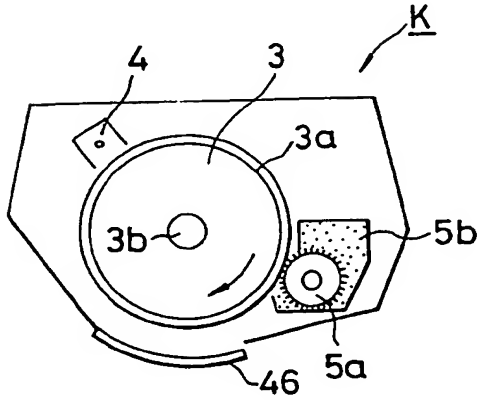
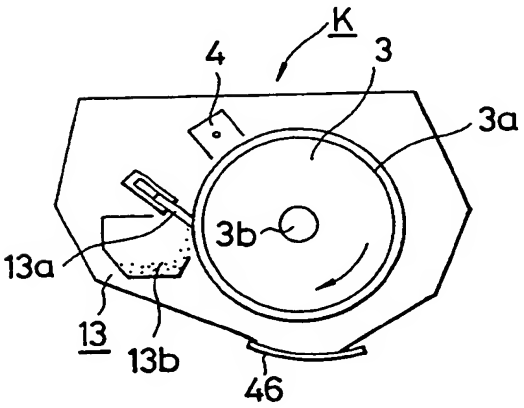


FIG. 26F



SPECIFICATION

Image formation apparatus

Background of the invention

Field of the invention

This invention relates to an image formation apparatus having an image bearing number and process means acting on the image bearing member.

Description of the prior art

Description will hereinafter be made with an electrophotographic copying apparatus taken as an example of the image formation apparatus.

An electrophotographic copying apparatus requires interchange of various expendables such as supply of developer, discard of waste toner, cleaning of corona wire, etc. or disposal during unsatisfactory feeding of transfer medium the maintenance and check-up of the apparatus. Also, when jam of transfer medium occurs, it is necessary to deal with the jammed transfer medium. In the past, when the maintenance of the copying apparatus has been effected, there has been an undesirable possibility that the hand or a tool touches the surface of the image bearing member to injure the surface of the image bearing member.

Usually, when maintenance is effected, the front door or the like of the apparatus is opened or the apparatus body is divisionally opened in vertical direction, but this has led to the undesirable possibility that extraneous light enters into the copying apparatus body so that the surface of the image bearing member, particularly the surface of the image bearing member in the image transfer area is exposed to the light which deteriorates the photosensitive layer of the image bearing member where the image bearing member has such photosensitive layer.

Further, recently, as shown in U.S. Patent No. 3,985,436, it has been considered to construct a kit in which process means such as a photosensitive drum, a developing device, a cleaner, a charger, etc. are made into a unitary structure and to interchange the various units at a time during interchange of the photosensitive drum, thereby reducing the maintenance work. By adopting the above-described construction, the user can simply interchange each process unit which particularly requires periodical maintenance, thus reducing the maintenance work to be done by the service man. Further, by interchanging the kit with a process kit which contains toner of other color, formation of colored images becomes possible. Alternatively, by interchanging the kit with a process kit which incorporates other developing means, the user can use developing means corresponding to the original image to be copied.

However, when the kit is interchanged or when the kit is removed from the apparatus body, the hand may touch the photosensitive drum held by the kit to strain or injure the drum. Possibly, the photosensitive drum having, for example, a zinc oxide photosensitive layer or an organic semiconductor photosensitive layer as the image bearing member held by the kit may be exposed to light with the result that the photosensitive layer is deteriorated. The injury or strain on the photosensitive drum or the deterioration of the photosensitive layer may adversely affect the formed images.

Particularly, where a process kit is used, the kit is often interchanged for the purpose of preservation or for the purpose of interchange with a process kit containing therein toner of other color as previously described, even during a period in which the kit is usable, and therefore it is necessary to positively protect the photosensitive drum.

It is an aim of one aspect of the present invention to provide an image formation apparatus in which, when maintenance of the apparatus such as jam disposal is effected, the surface of the image bearing member can be prevented from being injured or stained.

It is an aim in another aspect of the present invention to provide an image formation apparatus in which, when maintenance of the apparatus such as jam treatment is effected, the surface of the image bearing member is prevented from being exposed to light and thereby deteriorated.

It is an aim in a further aspect of the present invention to provide an image formation apparatus in which the image bearing member is protected thereby to enable clear images to be obtained.

The present invention provides an image formation apparatus having an image bearing member and process means acting on the image bearing member, characterized by a cover movable to a first position for covering the surface of the image bearing member and a second position retracted away from the first position, and means for moving the cover.

Thus, in the image formation apparatus of the present invention, the image bearing member can be reliably protected to thereby enable clear images to be obtained.

The invention will become more fully apparent from the following detailed description thereof taken in conjunction with the accompanying drawings.

Brief description of the drawings

Figure 1 is a cross-sectional view of a copying apparatus to which an embodiment of the present invention is applied.

Figure 2 is a cross-sectional view showing the body of the copying apparatus as it is opened.

Figure 3 is a perspective view of a cover.

Figures 4 and *5* are side views showing a mechanism for moving the cover.

Figure 6 is a perspective view of a process kit.

Figure 7 is a side view for illustrating the air guide of the cover.

Figure 8 is a perspective view of a copying apparatus to which another embodiment of the present invention is applied.

Figures 9 and *10* are cross-sectional views of the Figure 8 apparatus.

Figure 11 is a perspective view showing a mechanism for moving the cover.

Figure 12 is a cross-sectional view of the body of a

copying apparatus to which the present invention is applicable.

Figure 13 is a perspective view of the Figure 12 apparatus.

Figure 14 is a perspective view of a process kit.

Figure 15 is a perspective view of the process kit having a cover attached thereto.

Figure 16 is a perspective view of the cover.

Figure 17 is a front view illustrating the operation of the anti-slippage lever of the process kit.

Figure 18 is a perspective view of the driving device for the cover.

Figure 19 is a front view showing the cover in its closed position.

Figure 20 is a front view showing the cover in its opened position.

Figure 21 is a cross-sectional view of a copying apparatus to which another embodiment of the present invention is applied.

Figure 22 is a perspective view of a portion of a stay.

Figure 23 is a perspective view of a kit.

Figure 24 is a perspective view of another embodiment of the cover.

Figure 25 is a perspective view showing an embodiment of the cover for the slit exposure portion.

Figures 26A - 26F are side views of further embodiments of the process kit.

Description of the preferred embodiments

The present invention will hereinafter be described in greater detail with respect to some embodiments thereof.

Description will first be made of an embodiment of a copying apparatus to which the present invention is applicable.

Figure 1 is a cross-sectional view of a copying apparatus body C. Figure 2 is a cross-sectional view of the Figure 1 copying apparatus body as it is opened. In these Figures, reference numeral 1 designates an original carriage formed of a transparent material such as glass and reciprocable on rails R in the direction of arrow a. Reference numeral 2 denotes a short-focus small-diameter imaging element array. An original O placed on the original carriage 1 is illuminated by an illuminating lamp L and the reflected optical image thereof is slit-exposed onto a photosensitive drum 3 by the array 2. The photosensitive drum 3 is rotatable about its axis 3b in the direction of arrow b. Designated by 4 is a charger for uniformly charging the photosensitive drum 3 covered with a zinc oxide photosensitive layer or an organic semiconductor photosensitive layer 3a. The drum 3 uniformly charged by the charger 4 is subjected to image exposure by the element array 2, whereby an electrostatic latent image is formed on the drum. This electrostatic latent image is developed into a visible image by a developing device 5 comprising a magnet roller 5a and a toner reservoir 5b. On the other hand, a sheet P contained in a cassette S is fed onto the drum 3 by a feed roller 6 and register rollers 7 rotated in synchronism with the image on the photosensitive drum 3. By a transfer discharger 8, the toner image on the photosensitive drum 3 is transferred onto the sheet P. Thereafter, the sheet P is separated from the drum 3 by separator means (for example, a separating belt B shown or a separating corona discharger or the like) and directed to a fixing device 10 by a guide 9 and a pinch roller 9c for fixation of the toner image on the sheet P, whereafter the sheet P is discharged onto a tray 12 by discharge rollers 11. After the transfer of the toner image, any toner remaining on the drum 3 is removed therefrom by a cleaner 13. This cleaner 13 comprises a blade 13a and a toner reservoir 13b. Reference numeral 9b designates a separating roller, F denotes a heat absorbing filter, and reference numeral 16 designates a slit opening for directing an image of the original to the surface of the drum 3.

In the present embodiment, the photosensitive drum 3, and charger 4, the developing device 5, the cleaner 13 and the filter F disposed around the photosensitive drum 3 are surrounded by a frame member 14a as a light-intercepting wall, and together constitute a process kit 14. As will hereinafter be described, this process kit 14 is provided with respect to the body C so that it is withdrawable or dismountable in the direction of the rotational axis of the drum 3 when the body is opened, and when the process kit is mounted to or dismounted from the body, the sliding portion 14b of the frame member 14a of the process kit 14 is engaged with the body side guide 15 and guided thereby. The frame member 14a is formed of black rigid plastic, whereas this is not restrictive but the frame member 14a may alternatively be formed of metal or wood.

Now, as shown in Figure 2, the copying apparatus C is coupled by a support shaft 19 so that it can be divided into an upper housing 17 and a lower housing 18, and the upper housing 17 is upwardly pivotable about the support shaft 19 by a spring 19a. The process means such as the illuminatng optical system 2, L, the photosensitive drum 3, the developing device 5 and the cleaner 13 are disposed within the upper housing 17. The feed roller 6, the transfer discharger 8, the separator means 9a, the guide 9 and the fixing device 10 are disposed in the sheet transportation path within the lower housing 18. Thus, by the upper housing 17 being upwardly pivoted, the sheet transportation path becomes open.

Description will now be made of a case where the upper housing 17 is upwardly pivoted in order to enable maintenance of the copying apparatus such as jam treatment to be effected.

In the figure, reference numeral 20 designates a cover for shielding and protecting the exposed surface of the drum 3. The cover 20 is provided below the process kit 14 integrally therewith. This cover 20 is formed of black rigid plastic of the same quality as the frame member 14a, for example, ABS resin, and is of a curved shape so as to intercept light so that light does not impinge on the surface of the photosensitive drum 3 and also to prevent the drum surface from being damaged.

Figure 3 shows an example of the construction thereof. In Figure 3, there are pivotable arms 21a and 21b on the shaft 3b of the photosensitive drum 3 at

the lengthwise opposite ends thereof, and the ends of these arms are rotatably fitted on the lengthwise opposite ends of the drum cover 20 by means of a shaft 33. Further, the lengthwise opposite ends of the other end portion of the drum cover 20 are rotatably engaged with pivotable arms 22a and 22b by means of a shaft 34. The pivotable arms 22a and 22b are fixed to a shaft 23. An operating lever 25 is fixed to the end of the shaft 23. The pivotable arms 21a and 21b, as shown, are biased for counterclockwise rotation by a spring 24 (if required, a similar spring may be provided also for the arm 21b). That is, the cover 20 is always biased to a position for covering the surface of the drum 3. The spring 24 has the opposite ends thereof restrained by a projection 24a on the inner cover 14d of the kit 14 and a projection 24b on the arm 21a (Figures 4 and 5).

In the above-described construction, when the operating lever 25 is moved clockwisely by a mechanism to be described, the shaft 23 is also rotated clockwisely and the cover 20 can be rotated clockwisely by the pivotable arms 22a and 22b each having one end thereof fixed to this shaft. Accordingly, this cover 20 can be retracted from the position for coverng the surface of the photosensitive drum 3 (this condition is shown in Figure 3). Further, in the present embodiment, as shown in Figure 4, a projection 26 is integrally secured to the lower housing 18 and in a condition in which the kit 14, i.e., the photosensitive drum 3, has been inserted into a predetermined position, this projection 26 bears against the operating lever 25 when the upper housing 17 is closed, thereby pushing this lever 25 upwardly and moving it clockwisely. Thus, by the upper housing 17 being closed, the cover 20 automatically retracts from the surface of the drum 3, so that the transfer area is opened to thereby enable image formation to be effected.

Conversely, when the upper housing 17 is opened upwardly, the operating lever 25 becomes disengaged from the projection 26 as shown in Figure 5, so that the pivotable arms 21a and 21b are rotated counter-clockwisely by the resilient force of the spring 24 and in response thereto, the cover 20 is rotated counter-clockwisely to assume a position opposed to the surface of the drum 3, thus covering the exposed portion (transfer portion) of the photosensitive drum 3 from the transfer opening of the frame member 14a. That is, when the upper housing 17 is open, the cover 20 automatically covers the exposed portion of the surface of the drum 3 and intercepts light and therefore can prevent the influence of light upon the surface of the drum 3 and also prevent said surface from being damaged.

Further, in the present embodiment, the process kit 14 is constructed by making integral the various process means such as the photosensitive drum 3, the developing device 5, the cleaner 13, the charger 4, etc., and during interchange of the photosensitive drum, the respective units may be interchanged at a time to thereby reduce the maintenance work. That is, when the body C has been divided and opened, the kit 14 becomes removably mountable along the rails 15, 15 on the copying apparatus body side by a stopper (not shown) being released. In the present embodiment, when the kit 14 is to be taken out of the body C, it can be drawn out with the exposed portion Q of the photosensitive drum 3 being covered by the cover 20. Thus, light can be prevented from impinging on the surface of the drum 3 and therefore, deterioration or damage of the photosensitive layer can be prevented and the operability can be improved very greatly.

Particularly, where the kit construction is adopted, the surroundings of the kit 14 except for the transfer opening Q are covered by a frame member 30a as a light-intercepting wall. Thus, in the present embodiment, when the kit 14 is drawn out from within the copying apparatus body into the light environment, this transfer opening Q is covered by the cover 20 and therefore, the protection effect for the surface of the photosensitive drum is more improved.

Also, in the present embodiment, the spring 24 is provided and by the resilient force of this spring 24, the cover 20 is always biased to a position for covering the surface of the photosensitive drum 3 and therefore, the cover 20 becomes stable at a position for closing the opening Q.

Now, Figure 6 shows a perspective view of the process kit 14 as it has been taken out of the body C. In Figure 6, reference numeral 14c designates a grip portion for drawing out the kit body along the rail 15, 15, and reference numeral 14e denotes a handle portion for holding down the kit taken out. A slit opening 16 for exposure is formed in the upper portion of the kit 14. In the present embodiment, a rail 16a is provided along the opening 16 and a light-intercepting plate 28 (indicated by dotted line) can be fitted along this rail 16a. This light-intercepting plate 28 is formed of ABS resin or the like having the same light-intercepting function as the wall portion 14a, and is slidable in the direction of arrow a by means of a knob 28a (indicated by dotted line) so as to cover the opening 16, whereby the photosensitive drum 3 can be completely shielded from the ambient light and thus, deterioration of the photosensitive layer can be prevented.

However, this opening 16 need not always be shielded from light but, for example, where the width of the slit is small, the light-intercepting plate is not necessary.

As has hitherto been described, according to the present embodiment, even if the apparatus body is divided into two during maintenance of the body C such as jam treatment, the surface of the photosensitive drum is automatically covered by the cover and therefore, there is no possibility of the drum surface being damaged or deteriorated.

Also, in the present embodiment, when the upper housing 17 is in its closed position, if the cover 20 retracts and comes to assume a position near the cleaner 13 shown in Figure 7, the flow path of the wind created by a fan 27 can be guided by this cover 20. Thus, for example, when the wind is flowed to prevent the ozone around the charger 4 or the temperature rise at the cleaner 13, this will provide good means. The flow path of the wind is indicated by arrows in Figure 7. Reference numeral 27 designates a cross flow fan, and reference numeral 29 denotes an ozone filter.

The present embodiment has been described with respect to a case where the upper housing is opened for jam treatment or the like, but even where the housing is not divided into two upper and lower positions, a similar drum light-intercepting member can of course be constructed. For example, with the cover 20 moved to its retracted position by the operating lever 25 being manually moved clockwisely, this lever 25 may be locked by lock means (not shown).

As has been described above, if the present embodiment is used, there can be provided an image formation apparatus in which the image bearing member cannot be deteriorated or damaged even in the case of jam treatment or the like.

Reference is now had to Figures 8, 9, 10 and 11 to describe another embodiment.

In this embodiment, the body is not divided into two and opened, but the conveyor portion is spaced apart from the photosensitive drum 3 to thereby facilitate jam treatment.

In Figure 9, the conveyor portion 56 has a separating roller 9b as separator means, a transfer discharger 8, a guide 9 and a conveyance pinch roller 9c, and is pivotable about a support shaft 56a. By a plate spring 53 provided at one end of the conveyor portion 56 being forced up by a release lever 52, the positional relation between the conveyor portion 56 and the drum 3 is determined by a stopper (not shown). Another plate spring 54 provided in the conveyor portion 56 pushes up a transfer guide 58, and the transfer guide 58 pivotable about the lower roller shaft 7a of a register roller 7 bears against a stopper (not shown), whereby the positional relation between the transfer guide 58 and the drum 3 is determined. This condition is the copying capable condition.

Description will now be made of a case where jam is treated.

First, the operator opens the front door 57 of the body C (Figure 8). Then, the operator brings down a handle 50 clockwisely (direction of arrow c) (Figure 10). The handle 50 is secured to a shaft 51, and by pivotally moving the handle 50, the release lever 52 secured to the shaft 51 is rotated. When the release lever 52 is rotated to the position of Figure 9, the conveyor portion 56 is moved about a support shaft 56a and away from the drum 3. That is, the transfer discharger 8, the guide 9, etc. become spaced apart from the surface of the drum 3. Since the plate spring 54 pivotally moves, the transfer guide 58 is also rotated about the lower roller shaft 7a of the register roller 7 and away from the drum 3.

Now, in the present embodiment, when the release lever 52 for jam treatment is operated, the cover 20 is also moved in response to this operation. The mechanism therefor will hereinafter be described.

An arm 55 is secured to one end portion of the shaft 51, and the end of the arm is bifurcated. The pin 21c of the pivotable arm 21b is engaged with the bifurcated portion 55a of the arm 55 (Figure 11). Thus, the arm 55 also rotates clockwisely in response to the clockwise rotation of the release lever 52. The pivotable arm 21b rotates counter-clockwisely in response to the movement of the pin 21c, and moves, against the resilient force of the spring 24, the cover 20 into the pace from which the conveyor portion 56 has been lowered and to a position for covering the surface of the drum 3 (Figure 10).

Thus, during jam treatment, the drum 3 is protected by the cover. When the lever 52 arrives at the release position of Figure 9, it is held at that position by the gravity of the conveyor portion 56.

If, after jam treatment, the operator turns the handle 50 counter-clockwisely and returns it to its operative position shown in Figure 8, the cover 20 will retract from the surface of the drum 3 and the conveyor portion 56 and the transfer guide 58 will return to their operative positions. Again in the present embodiment, the kit 14 is removably mountable with respect to the body C.

According to the above-described present embodiment, the cover can be moved in response to other operation such as jam treatment, whereby deterioration or damage of the drum 3 can be reliably prevented.

Reference is now had to Figures 12 - 20 to describe still another embodiment. This embodiment is of a construction in which the copying apparatus body is not divided into two.

Figure 12 is a cross-sectional view of a copying apparatus to which the present embodiment is applicable. In Figure 12, members functionally similar to those of Figure 1 are given reference numerals similar to those in Figure 1. E designates a manual supply table.

Now, in the present embodiment, the photosensitive drum 3 and the charger 4, the developing device 5, the cleaner 13 and the filter 40 disposed around the photosensitive drum 3 are integrally surrounded by the frame member 14a as a light-intercepting wall and together constitute a process kit 14. The frame member 14a is formed of black rigid plastic, but alternatively it may be formed of metal or wood. The process kit 14, as shown in Figure 13, is withdrawable in the direction of the rotational axis of the drum 3, namely, removably mountable with respect to the body C, and when it is inserted into the body, it is guided by the sliding portion 14b of the frame member 14a of the process kit 14 being engaged with the body side guide 15. In Figure 13, the kit 14 is shown with the frame member 14a thereof removed to show the individual units. Figure 14 is a perspective view of the process kit as it has the frame member 14a mounted thereon. In Figure 14, reference numeral 41 designates a window through which the image exposure light is applied onto the drum 3, and reference numeral 40 denotes a filter member. Reference numeral 42 designates an anti-slippage lever for positioning the kit 14 at its inserted position when the kit has been inserted into the body C. D denotes the front door of the body C which is openable and closable with respect to the body C. In Figure 13, the door D is opened with its lower portion as the hinge. Designated by 43 is the handle of the kit 14.

Description will now be made of a moving mechanism for the cover protecting the surface of

the photosensitive drum 3 held by the kit 14 when the process kit 14 is removed from the copying apparatus body C.

In an embodiment which will now be described, an example is shown in which the cover is formed of a non-transparent rigid material so as to intercept the light to the surface of the drum 3 provided in the kit 14 and to prevent the surface of the drum 3 from being injured.

In the present embodiment, the kit 14 has a transfer area opening t provided in the portion thereof which becomes opposed to the transfer charger 8 when the kit has been inserted into the body C. On the frame member 14a of the kit 14, rails 44 and 45 are provided at the opposite end portions of the opening t (Figure 15). A cover 46 for intercepting light is slidably fitted on the rails 44 and 45 and opens and closes the opening t. The cover 46 is partly arcuate as shown in Figure 16 and is smoothly slidable along the rails 44 and 45. As shown in Figure 15, the end 46a of the cover 46 bears against one end of the frame member 14a with the opening t being closed, and the cover holds such position unless any extraneous force is applied thereto. Since the cover 46 is formed of a rigid member such as a non-transparent black plastic plate or a metal plate (an iron plate or the like), it can intercept light so that the light may not impinge on the surface of the photosensitive drum and can also prevent the surface of the photosensitive drum from being injured, by closing the opening t and covering the photosensitive drum 3 as shown in Figure 15. The zinc oxide photosensitive layer or the organic semiconductor photosensitive layer 3a used in the present embodiment is liable to be deteriorated particularly for the wavelength of 300 - 400 nm or 400 nm or less, but the black plastic plate or the iron plate can reliably intercept the light of this wavelength range.

Dowels 47 and 48 are provided on the opposite ends of the cover 46.

On the other hand, the anti-slippage lever 42 provided on a slide plate (not shown) of the body C is pivotable about a shaft 49 between positions A and B as shown in Figure 17 and, when the lever 42 is in the position A, the process kit 14 can be drawn out of the body C, but when the lever 42 is in the position B, the process kit 14 cannot be drawn out of the body C due to the interference of the lever 42. Further, as shown in Figure 18, arms 60 and 61 are secured to the shaft 49 of the lever 42 and are also pivotable about the shaft 49 between the positions A and B in synchronism with the lever 42. Pins 62 and 63 are secured to the back side plate (not shown) of the body C, and a slide plate 64 is mounted for sliding along slots 65 and 66 engaged by the pins 62 and 63. The slide plate 64 has a pin 67 projected therefrom which is fitted in the slot 68 of the arm 60. In response to the pivotal movement of the lever 42 from the position A to the position B, the slide plate 64 slides from a position A' toward a position B'. A slide plate 69 mounted on the front side plate (not shown) of the body is similar in construction to the slide plate 64 and, if the lever 42 is moved from the position A to the position B, the slide plate 69 also slides from the position A' toward the position B' in response thereto.

Now, the slide plates 64 and 69 are provided with cut-aways 70 and 71 which are adapted to fit on the aforementioned dowels 47 and 48 of the cover 46 when the process kit 14 inserted along the guide 15 of the body C has arrived at a predetermined inserted position. This condition is shown in Figure 19. Figure 19 is a cross-sectional view showing the process kit 14 as it has been inserted into or drawn out of the body C, and at this time, the lever 42 is in the position A and the cut-away 70 of the slide plate 64 is fitted on the dowel 47 with the cover 46 being in a position wherein it closes the transfer opening t and covers the photosensitive drum 3 so that light may not impinge on the drum 3. When the lever 42 is moved to the position B to position the process kit 14 with respect to the body C after the kit 14 has been inserted into the body C, the side plates 64 and 69 slide toward the position B' and in response thereto, the cover 46 also slides toward the position B' to uncover the opening t and make the photosensitive drum exposed, thus bringing about a condition in which copying is possible (Figure 20). The spacing between fthe slide plates 64 and 69 and the spacing between the dowels 47 and 48 are greater than the width of copy paper and therefore, these do not interfere with the passage of copy paper.

Next, when the process kit 14 is to be drawn out of the body C, the lever 42 is moved to the position A to permit movement of the kit 14, whereupon the cover 46 comes to close the opening t (Figure 19) and the surface of the photosensitive drum is covered by the cover 46, so that even after the kit 14 has been taken out of the body C, the cover prevents light from inpinging on the photosensitive drum 3 and deteriorating the same, and thus the cover protects the drum 3. That is, the cover 46 can be moved in response to the release of the positioning of the process kit 14.

In the above-described embodiment, the cover 46 may be provided with a click so as to maintain the open and closed positions. Alternatively, the cover may always be biased to its open or closed position by a spring or the like.

Thus, in the present embodiment, when the kit is inserted into or removed from the body, the cover means in response to movement of the lever, whereby the photosensitive drum can reliably be shielded from light or prevented from being injured.

The mechanism for driving the cover 46 may also be effected by utilization of a plunger.

According to the present embodiment, as described above, when the kit 14 is taken out of the body C, the exposed portion of the photosensitive drum 3 (namely, that portion which corresponds to the transfer opening t provided in the rame member 14a for the image transfer) can be covered by the cover 46. Thus, the kit 14 can be taken out of the body C with the photosensitive drum 3 being shielded from light, that is, without the photosensitive layer being deteriorated or injured, and the kit 14 can be kept as removed from the body C.

In the present embodiment, the surface of the drum 3 is protected not only during the mounding or dismounting of the kit 14 with respect to the body C,

but also, for example, when the front door or the like is opened for the repair of the body C, the cover may be moved by operating this lever to thereby protect the photosensitive drum.

Also, in the case of the present embodiment, the cover is moved in response to movement of the lever, but it is also possible to move the cover 46 directly manually in the condition shown in Figure 4. In this example, the cover 46 can be directly manually closed along the rails 44 and 45 to thereby permit jam treatment to be carried out. After completion of the jam treatment, the cover 46 may be manually opened.

An example will further be shown below in which the cover is driven in response to the movement of the kit during the insertion or the removal thereof with respect to the body.

Figure 21 shows a condition in which the process kit 14 has been inserted into the copying apparatus body C with the cover 46 opened.

In the body C, a stay 70 is provided at a position opposed to thwe cover 46 of the kit 14 inserted. As shown in Figure 22, an S-shaped slot 71 is provided in the stay 70. Also as shown in Figure 23, a pin 72 is provided on the cover 46 of the process kit 14 substantially centrally of the insertion direction thereof and at the opening-closing direction side edge, and the cover 46 may be opened by the pin 72 being moved from A to B. When the process kit 14 is half-inserted into the body C, the pin 72 meshes with the slot 71 at a position A' indicated in Figure 22 and, wherein the kit 14 is further inserted, the pin 72 is guided by the slot 71 and the kit 14 arrives at a predetermined inserted position and the pin 72 finally comes to a position B. This, as viewed from the process kit 14, means that the pin 72 has moved from A to B and therefore, the cover 46 changes from its closed position to its opened position. Conversely, when the process kit 14 is drawn out of the body C, the cover 46 likewise changed from its opened position to its closed position. Figure 21 is a cross-sectional view obtained by sectioning Figure 22 along line EF. Thus, in the present embodiment, the cover 46 can be opened or closed in response to the operation of inserting the process kit 14 into the copying apparatus body C or the operation of taking the kit 14 out of the body C.

Thus, according to the present embodiment, whenever the process kit has been drawn out of the body, the photosensitive drum is shielded from light by the cover and so, the photosensitive drum is never deteriorated. If the cover is formed of a shock-resisting material, the photosensitive drum will become free of the danger that the user touches the photosensitive drum or strikes it against something to thereby injure the drum.

Figure 24 shows still another embodiment.

In the present embodiment, sponge-like moltplene 46b is attached to the fore end 46a of the cover 46. Thus, the gap between the fore end 46a of the cover 46 and the end of the frame member 14a is completely closed by this moltplene 46b to thereby enhance the light-intercepting effect.

Figure 25 shows still another embodiment.

In the present embodiment, a slit opening 41 through which the image exposure light is applied onto the drum 3 is closed.

In Figure 25, reference numerals 41a and 41b designate rails secured along the slit opening 41 through which the image exposure light is applied onto the drum 3. If a slide plate T formed of a material similar to that of the cover is fitted along the rails 41a and 41b by means of a knob Ta, the slit opening 41 can be closed. If the slide plate T is drawn out of the rails 41a and 41b, the opening 41 can be opened. Thus, the present embodiment can more reliably intercept the light to the image bearing member. The slide plate T need not always be employed, but for example, a pivotable plate may be mounted along the opening 41. The opening-closing of the opening 41 can also be easily accomplished by this. Also, in the present embodiment, mounting or dismounting of the slide plate T with respect to the rails 41a and 41b may be effected with the kit 14 mounted to or removed from the body C.

By being used in combination with the previous embodiment, the present embodiment can reliable intercept the light to the image bearing member, whereas where the width of the opening is short, it is not always necessary to open and close the opening for image exposure as in the present embodiment, but opening-closing of the opening may be effected as required. The present embodiment is of course applicable not only to the opening-closing of the opening 41 for image exposure, but also, for example, to the opening-closing of an opening for pre-exposure if such opening is provided.

Each of the above-described embodiments has been shown with respect to a case where the cover is formed of a black non-transparent rigid material so that light may not impinge on the surface of the photosensitive drum 3 and that the surface of the drum 3 may not be injured. However, the present invention is not restricted thereto, but the cover may be formed, for example, of a non-transparent soft material (black polyester film, moltplene or the like) primarily for the purpose of light-interception (including reflection and absorption of light) or formed of a transparent rigid material (transparent plastic or the like) primarily for the purpose of preventing the drum surface from being injured. Further, even in a case where light-interception is the purpose, the cover need not always be formed of a non-transparent material, but may be formed of a light-transmitting material if it can intercept light rays of a wavelength range which will deteriorate the photosensitive layer. Also, for example, in the case of an image formation method wherein a magnetic light image is formed on an insulating layer, preventing the insulating layer from being injured will become a primary purpose of the cover.

The material of the cover may be a metal such as iron, aluminum or the like, or other known material such as resin, wood or the like. If, of these materials, a material having elasticity is employed, the opening-closing operation of the cover can be accomplished more smoothly. Further, if, of these materials, a shock-resisting material is selected, the kit can be mounted or dismounted with the photosensitive drum 3 being covered by the cover.

In the present embodiment, an image bearing member provided with an organic semiconductor photosensitive layer or a zinc oxide photosensitive layer has been shown as an example, whereas it will be apparent that the present invention is not restricted thereto but other photosensitive layer is also usable. In the present invention, the image bearing member is not restricted to one using a photosensitive layer but it will be apparent that the invention is also applicable, for example, to an image bearing member using an insulating layer or the like. The shape of the image bearing member is not restricted to the drum shape, but may be, for example, an endless belt passed over pulleys.

The present invention is not restricted to the magnetic brush development, but other developing system such as, for example, the cascade development, the fur brush development or the powder cloud development is also applicable.

The cleaning system is not restricted to the blade cleaning, but the fur brush cleaning, the roller cleaning, the web cleaning or the like is applicable.

Further, the imaging element is not restricted to the short-focus small-diameter imaging element array, but may also be an ordinary lens or a bar lens or the like.

The process for image formation is restricted in no way, but for example, the Carlson system, the NP system (U.S. Patent No. 3,666,363) or the PIP system is also applicable.

Also, in the present embodiment, an example in which, in addition to the photosensitive drum, various process means such as the developing device, the cleaner, the charger, etc. have been integrally incorporated in the process kit has been shown, but the present invention is not restricted thereto. For example, as shown in Figures 26A - 26F, the array 2, the charger 4, the developing device 5 and the cleaner 13 as the process means, integrally with the photosensitive drum 3, may be incorporated in the kit K (Figure 26A). Further, the separator means 9a may be integrally incorporated (Figure 26B). Also, the developing device 5 and the photosensitive drum 3 (Figure 26C), the cleaner 13 and the photosensitive drum 3 (Figure 26D), the charger 4, the developing device 5 and the photosensitive drum 3 (Figure 26E), or the charger 4, the cleaner 13 and the photosensitive drum 3 (Figure 26F) may be integrally incorporated. The image bearing member is not restricted to the photosensitive drum 3, as already mentioned. That is, the process kit may integrally have the image bearing member and a part of the whole of the process means. The process means acting on the image bearing member are, in the present embodiment, the array 2, the charger 4, the developing device 5, the transfer discharger 8, the separator means 9a, the cleaner 13, etc.

According to the present invention, as has been described above, there can be provided an image formation apparatus in which the image bearing member is protected by a cover and can be prevented from being deteriorated or injured.

CLAIMS

1. An image formation apparatus having an image bearing member and process means acting on said image bearing member, characterized by:

a cover movable to a first position for covering the surface of said image bearing member and a second position retracted away from said first position; and

means for moving said cover.

2. A process kit integrally having an image bearing member and process means acting on said image bearing member and removable mountable to an image formation apparatus, characterized by:

a cover movable to a first position for covering the surface of said image bearing member and a second position retracted away from said first position.

3. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said cover is a protective cover for preventing the surface of said image bearing member from being injured.

4. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said cover is a light-intercepting cover for intercepting the light to the surface of said image bearing member.

5. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said cover is formed of a rigid material.

6. The image formation apparatus or the process kit according to claim 1 or 2, characterized in that said cover is formed of a member capable of intercepting light of wavelength of 300-400 nm or 400 nm or less.

7. The image formation apparatus or the process kit according to Claim 5, characterized in that said rigid material is resin or metal.

8. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said cover is black.

9. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said process means has a developing device.

10. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said process means has a short-focus small-diameter imaging element array.

11. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said process means has a charger.

12. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said process means has a cleaner.

13. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said process means has separator means.

14. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said process means has a transfer discharger.

15. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said image bearing member has an organic semiconductor photosensitive layer.

16. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said image bearing member has a zinc oxide photosensitive layer.

17. The image formation apparatus according to Claim 1, characterized in that said means for moving said cover has a slot.

18. The image formation apparatus according to Claim 1, characterized in that said means for moving said cover has a pin provided on said cover.

19. The The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said cover is fitted on rails.

20. The image formation apparatus according to Claim 1, characterized in that said moving means is operatively associated with other operation of the apparatus body.

21. The image formation apparatus according to Claim 20, characterized in that said other operation is the opening-closing operation of the apparatus body.

22. The image formation apparatus according to Claim 20, characterized in that said other operation is the opening operation of the transfer medium transportation path.

23. The image formation apparatus according to Claim 22, characterized in that the opening operation of said transfer medium transportation path is the rotating operation of a guide.

24. The image formation apparatus according to Claim 22, characterized in that the opening operation of said transfer medium transportation path is the operation of spacing a transfer discharger apart from a photosensitive drum.

25. The image formation apparatus according to claim 1, characterized in that said apparatus has a structure which can be divided into a first support and a second support, said first and second supports are coupled together by a support shaft, and said fist support is upwardly pivotally moved about said support shaft.

26. The image formation apparatus according to Claim 25, characterized in that said upward pivotal movement of said first support is effected by a spring.

27. The image formation apparatus according to Claim 25, characterized in that a convergent light transmitter, an illuminating lamp, a photosensitive drum, a developing device, a cleaner and a corona charger are provided in said first support.

28. The image formation apparatus according to claim 25, characterized in that a feed roller, a transfer discharger, separator means, a guide and a fixing device are provided in said first support.

29. The image formation apparatus according to Claim 1, characterized in that said moving means has a pivotable arm.

30. The image formation apparatus according to Claim 1, characterized in that said moving means has an operating lever.

31. The image formation apparatus according to Claim 25, characterized in that the engaging means engageable with said moving means to move said cover to said second position is provided in said second support.

32. The image formation apparatus according to Claim 31, characterized in that said engaging means has a projection.

33. The image formation apparatus or the process kit according to Claim 1 or 2, characterized in that said cover is subjected to a biasing force to said first position for covering the surface of said image bearing surface.

34. The image formation apparatus or the process kit according to Claim 33, characterized in that said biasing force is imparted by a spring.

35. The process kit according to Claim 2, characterized in that said process means integrally has a developing device, a cleaner and a charger.

36. The process kit according to Claim 2, characterized in that said process means integrally has a short-focus imaging element array, a developing device, a charger and a cleaner.

37. The process kit according to Claim 36, characterized in that said process means further has separator means.

38. The process kit according to Claim 2, characterized in that said process means integrally has a developing device and a charger.

39. The process kit according to Claim 2, characterized in that said process means integrally has a developer and a cleaner.

40. An image formation apparatus substantially as hereinbefore described with reference to any of the accompanying drawings.

41. A process kit substantially as hereinbefore described with reference to any of the accompanying drawings.

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